

REMARKS**I. General**

Claims 1-37 are pending. Claims 1-4 and 8-33 are rejected, claims 5-7 are objected to, and claims 34-37 are allowed. The issues raised in the Office Action mailed February 5, 2004, are:

- Claims 1-4 and 8-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art in view of US Patent Number 6,493,410 to Shalom et al. (hereinafter *Shalom*) and further in view of US Patent Number 6,400,416 to Tomasz (hereinafter *Tomasz*);
- Claims 5-7 are objected to as being dependent upon a rejected base claim, but would be allowed if rewritten in independent form including all of the limitations of the base claim and any intervening claims; and
- Claims 34-37 are allowed.

II. Claim Amendments

Claims 1, 3-5, and 8 are amended, and claim 2 is cancelled. Claim 1 is amended to include the elements previously presented in dependent claim 2, and thus, claim 2 is cancelled. Claims 3-5 and 8 are amended to properly depend from claim 1 due to the cancellation of claim 2. No new matter is added by the claim amendments.

III. Rejection under § 103(a)—Combination of Applicants' admitted prior art, *Shalom*, and *Tomasz*

Claims 1-4 and 8-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz*. Applicants respectfully traverse the rejection and assert that the rejected claims are allowable at least for the reasons stated below.

To establish a prima facie case of obviousness under 35 U.S.C. § 103(a), there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. In addition, the prior art cited must teach or suggest all the claim limitations. See MPEP §2143. Applicants respectfully assert that the rejection does not

satisfy these two requirements, and therefore, the claims are patentable under 35 U.S.C. § 103(a).

A. Applied References Fail to Teach All Claim Limitations

Applicants respectfully assert that even if the suggested combinations were made, the resulting combination of Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz* would not teach each and every element of the following claims.

1. Independent Claims

Claims 1, 15, and 30

Claim 1, as amended, recites, in part:

a first single sideband mixer coupled to said input signal interface and said output signal interface...

a second single sideband mixer coupled to said input signal interface and said output signal interface...

Claim 15 recites, in part:

a first single sideband mixer circuit having a first input and a first output...

a second single sideband mixer circuit having a second input and a second output...

Claim 30 recites, in part:

providing a first single sideband mixer...

providing a second single sideband mixer...

Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz* fails to teach these features of independent claims 1, 15, and 30. Applicants' admitted prior art teaches mixer 121 used to convert an input signal frequency to a high intermediate frequency utilizing a local oscillator 131, (Specification, page 8, lns 14-15), and a mixer 122 is used to convert the high intermediate frequency signal to a desired output frequency signal utilizing local oscillator 132. (Specification, page 9, lns 1-3). However, mixers 121 and 122 are not taught as a first single sideband mixer and a second single sideband mixer.

Shalom discloses a frequency synthesizer including a direct digital synthesizer 10, a digital-to-analog converter 12 for receiving output from the direct digital synthesizer, a first

bandpass filter 14 for filtering the direct digital synthesizer output signal, a source of a mixing frequency signal, a single sideband mixer 32 for mixing the mixing frequency signal with the filtered direct digital synthesizer output, a divider 18 for dividing the mixer output signal, and a second bandpass filter for filtering the divided signal. (*Shalom*, col. 1, ln 65 to col. 2, ln 15; Figure 2). Thus, *Shalom* teaches a frequency synthesizer based on a direct digital synthesizer that includes one single sideband mixer. The disclosure of *Shalom*, teaching only one single sideband mixer, fails to teach or suggest the use of a first and second single sideband mixer, as recited in independent claims 1, 15, and 30. Furthermore, *Tomasz* discloses first mixer 208 (*Tomasz*, col. 3, lns 27-32), and second mixers 214 (col. 3, lns 41-45), but mixer 208 and mixers 214 are not single sideband mixers. Hence, *Tomasz* fails to cure the deficiencies of *Shalom*. Thus, the cited art fails to teach all the elements recited in claims 1, 15, and 30. Therefore, the rejection under 35 U.S.C. § 103(a) for claims 1, 15, and 30 should be withdrawn.

2. Dependent Claims

Claims 3, 4, 8-14, 16-29, and 31-33 depend directly or indirectly from their respective base claims 1, 15, and 30, and thereby inherit all of the respective limitations. Accordingly, it is respectfully submitted that the dependent claims are allowable based on their dependency from independent base claims 1, 15, and 30 for at least the reasons discussed above. Thus, Applicants respectfully submit that based on the arguments above, claims 3, 4, 8-14, 16-29, and 31-33 are patentable over the 35 U.S.C. §103(a) rejection of record. In addition to their dependency from the respective base claims 1, 15, and 30, the dependent claims are also allowable based on further limitations recited therein. Specific examples of additional limitations present in the dependent claims which are not found in the applied art are set forth below.

Applicants respectfully request the Examiner to reconsider all the elements of the dependent claims pointed out below in determining the existence of patentable subject matter.

Claims 11, 13, and 14

Claims 11, 13, and 14 recite, in part:

a filter...providing attenuation of image signals substantially equal to a difference between system requirements and image rejection achieved by said first single sideband mixer.

Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz* fails to teach this feature of claims 11, 13, and 14. The Examiner asserts that filter 210 of *Tomasz* discloses this feature of claims 11, 13, and 14. (Office Action, pages 3-4). Yet, the Examiner fails to address the "providing of attenuation of image signals..." in rejecting claims 11, 13, and 14. Furthermore, *Tomasz* merely teaches a filter 210 that is coupled to a first mixer 208 for filtering an intermediate frequency signal, (*Tomasz*, Col. 3, lns 28-33; Fig. 2), but *Tomasz* does not teach providing the attenuation of image signals equal to a difference between system requirements and image rejection achieved by a first single sideband mixer, as recited in claims 11, 13, and 14. Therefore, the Applicants respectfully request that the 35 U.S.C. §103(a) rejection for claims 11, 13, and 14 be withdrawn.

Claim 12

Claim 12 recites, in part:

a filter ...providing attenuation of carrier leakage signals substantially equal to the difference between system requirements and carrier leakage rejection achieved by said first single sideband mixer.

Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz* fails to teach this feature of claim 12. The Examiner asserts that filter 210 of *Tomasz* discloses this feature of claim 12. (Office Action, page 3). Yet, the Examiner fails to address the "providing of attenuation of carrier leakage signals..." in rejecting claim 12. Furthermore, *Tomasz* simply teaches a filter 210 that is coupled to a first mixer 208 for filtering an intermediate frequency signal, (*Tomasz*, Col. 3, lns 28-33; Fig. 2), but *Tomasz* does not teach providing the attenuation of carrier leakage signals equal to a difference between system requirements and carrier leakage rejection achieved by a first single sideband mixer, as recited in claim 12. As such, the references cited fail to teach all the claim limitations of claim 12. Hence, the Applicants respectfully request that the 35 U.S.C. §103(a) rejection for claim 12 be withdrawn.

Claims 17 & 18

Claims 17 and 18 recite, in part:

a phase shifter at said first input to split a signal provided thereto...

In rejecting claims 17 and 18, the Examiner makes reference to element 54 of Figure 2 of the *Marshall* reference that was used by the Examiner in the Final Office Action mailed September 30, 2003. This rejection is nonsensical as the Examiner clearly states on page 2 of the current Office Action that claims 1-4 and 8-33 are rejected in view of Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz*. (Office Action, page 2). The Examiner no longer cites *Marshall* as rejecting the pending claims, and therefore this rejection of claims 17 and 18 is incorrect as the Examiner is citing a reference that is no longer used in rejecting the claims. Thus, the Examiner's rejection is inadequate as the Examiner has failed to establish which elements of the currently cited art discloses these features of claims 17 and 18.

Furthermore, the art cited in the current Office Action fails to disclose this feature of claims 17 and 18. *Shalom* discloses a frequency synthesizer that includes a direct digital synthesizer 10, a digital-to-analog converter 12, a first bandpass filter 14, a source of a mixing frequency signal, a single sideband mixer 32, a divider 18 for dividing the mixer output signal, and a second bandpass filter for filtering the divided signal. (*Shalom*, col. 1, ln 65 to col. 2, ln 20). However, *Shalom* fails to disclose a phase shifter at the first input to split a signal provided thereto, as required by claims 17 and 18. *Tomasz* fails to cure this deficiency. Thus, the cited art fails to teach all the elements of claims 17 and 18. Therefore, Applicants respectfully request that the 35 U.S.C. §103(a) rejection for claims 17 and 18 be withdrawn.

Claim 22

Claim 22 recites:

amplifier provides linear operation substantially only at said increased frequency.

Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz* fails to teach this feature of claim 22. The Examiner asserts that Applicants' admitted prior art amplifier 111 and amplifier 224 of *Tomasz* disclose an amplifier coupled between first and second mixers. (See Final Office Action at 5). However, neither amplifier cited by the Examiner teaches an amplifier that provides linear operation substantially only at said increased frequency. As such, the references cited fail to teach all the claim limitations of

claim 22. Hence, the Applicants respectfully request that the 35 U.S.C. §103(a) rejection of claim 22 be withdrawn.

Claims 24 & 25

Claims 24 and 25 recite, in part:

a filter coupled in a signal path between said first single sideband mixer circuit and said second single sideband mixer circuit, wherein said filter provides attenuation approximately equal to a difference between system requirements and an amount of image rejection provided by said first single sideband mixer.

Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz* fails to teach this feature of claims 24 and 25. The Examiner asserts that Applicants' admitted prior art in view of filter 210 of *Tomasz* discloses a filter coupled to a first single sideband mixer. (See Final Office Action at 4). However, the Examiner fails to address the element of claims 24 and 25 relating to providing attenuation approximately equal to a difference between system requirements and an amount of image rejection provided by said first single sideband mixer. In addition, filter 210 of *Tomasz* is coupled to a first mixer 208 for filtering an intermediate frequency signal, (*Tomasz*, Col. 3, lns 28-33; Fig. 2), but this filter is not coupled in a signal path between a first single sideband mixer and a second single sideband mixer that provides attenuation equal to the difference between system requirements and an amount of image rejection provided by the first single sideband mixer. Furthermore, *Shalom* discloses a first band pass filter 14 and a second band pass filter 20. (*Shalom*, col. 2, lns 42-50; Figure 2). However, bandpass filter 14 is located before single sideband mixer 32, and bandpass filter 20 is located after single sideband mixer 32. Thus, filters 14 and 20 are not coupled in a signal path between a first single sideband mixer and a second single sideband mixer circuit, as *Shalom* fails to disclose a first and second single sideband mixer circuit. As such, the references cited fail to teach all the claim limitations of claims 24 and 25. Hence, the Applicants respectfully request that the 35 U.S.C. §103(a) rejection for claims 24 and 25 be withdrawn.

Claim 27

Claim 27 further recites:

 said increased frequency is a frequency above a desired range of video signal frequency division channels and wherein said decreased frequency is a particular video signal frequency division channel of said range of video signal frequency division channels.

Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz* fails to teach this feature of claim 27. The Examiner asserts that the Applicants' admitted prior art teaches this feature of claim 27. (Office Action, page 2). Yet, the Examiner merely asserts that the Applicants' admitted prior art teaches a first mixer circuit having a first input and a first output, where the signal provided to the first input is provided to the first output at an increased frequency (Office Action, page 2), but the Examiner fails to establish that the cited art discloses an increased frequency that is a frequency above a desired range of video signal frequency division channels, as recited in claim 27. Therefore, the Applicants respectfully request that the 35 U.S.C. §103(a) rejection for claim 27 be withdrawn.

Claims 31-33

Applicants respectfully assert that the Examiner has failed to address the limitations of claims 31-33 in making his rejection. Applicants have requested the Examiner in the responses submitted on July 7, 2003, and on December 23, 2003, to address claims 31-33 in making his rejection. However, the Examiner continues to disregard claims 31-33 in making his rejection. Thus, as argued in the amendments filed on July 7, 2003, and on December 23, 2003, the Examiner has failed to specifically articulate any rejection early in the prosecution process so that the Applicants have an opportunity to provide evidence of patentability and otherwise respond completely at the earliest opportunity. Thus, Applicants respectfully request that the Examiner specifically set forth the grounds for rejection with respect to claims 31-33, so that the Applicants may have a full and fair opportunity to explore the patentability of these claims.

Claim 31 recites:

 disposing a filter between said first single sideband mixer and said second single sideband mixer, wherein said filter is adapted to substantially rely upon said first single sideband mixer for image rejection.

Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz* fails to teach this feature of claim 31. *Shalom* discloses a first bandpass filter 14 and a second bandpass filter 20. The first bandpass filter 14 is located before single sideband mixer 32 while the second bandpass filter 20 is located after the single sideband mixer 32. (*Shalom*, col. 1, ln 65 to col. 2, ln 50; Figure 2). However, *Shalom* fails to disclose the existence of a first single sideband mixer and a second sideband mixer. Therefore, *Shalom* does not teach disposing a filter between a first single sideband mixer and a second sideband mixer which is adapted to rely upon the first single sideband mixer for image rejection. Furthermore, *Tomasz* fails to cure this deficiency. Thus, the cited references fail to teach all the elements of claim 31, and therefore, the Applicants respectfully request that the 35 U.S.C. §103(a) rejection for claim 31 be withdrawn.

Claims 32 and 33 recite:

at least one filter having frequency selection characteristics insufficient to independently provide head end quality signal characteristics.

Claim 33 further recites:

at least one amplifier having linearity characteristics insufficient to provide head end quality signal characteristics when tones associated with an undesired image signal are present with tones of a signal to be amplified.

Applicants respectfully assert the Applicants' admitted prior art in view of *Shalom* and further in view of *Tomasz* fails to teach these features of claims 32 and 33. *Shalom* and *Tomasz* teach the use of filters, but neither *Shalom* nor *Tomasz* teach the use of a filter having frequency selection characteristics insufficient to independently provide head end quality signal characteristics. In addition, neither reference teaches an amplifier having linearity characteristics insufficient to provide head end quality signal characteristics when tones associated with an undesired image signal are present with tones of a signal to be amplified as recited in claim 33. As such, the references cited fail to teach all the claim limitations of claims 32 and 33. Thus, the Applicants respectfully request that the 35 U.S.C. §103(a) rejection for claims 32 and 33 be withdrawn.

B. No Suggestion or Motivation to Combine**1. No Suggestion or Motivation to Combine Applicants' Admitted Prior Art and *Shalom***

The Examiner concedes that the primary reference, the Applicants' admitted prior art, fails to disclose the use of single sideband mixers. (Office Action, page 3). Thus, in order to overcome this deficiency, the Examiner relies on *Shalom* as disclosing single sideband mixers. Yet, proper motivation is required for these references to be combined and used for an obviousness rejection under 35 U.S.C. § 103.

The Examiner asserts that because single sideband mixers are well known from the disclosure of *Shalom*, it would have been obvious to provide single sideband mixers in place of the first and second mixers of Applicants' admitted prior art to provide either the sum or difference of the input frequencies and to provide a lower inherent noise output and remove the unwanted image signal. (Office Action, page 3). However, it is well settled that the prior art must suggest the desirability of the claimed invention. MPEP §2143.01. Yet, neither *Shalom* nor the Applicants' admitted prior art suggest such desirability to obtain the single sideband mixer circuits as claimed. In fact, Applicants' admitted prior art clearly teaches that filters 141 and 142 are bandpass filters utilized to filter the HIF signal, remove unwanted image signals, and remove or suppress other undesired spurious signals on either side of the desired output signal frequency. (Specification at page 8, ln 20 to page 9, ln 16). As such, filters 141 and 142 provide very sharp pass band cutoffs. (Specification at page 8, ln 23, page 9, ln 16). Thus, the Examiner's motivation must fail as Applicants' admitted prior art filters 141 and 142 clearly operate so that any unwanted image signals are already removed. One of ordinary skill in the art would not have been led to replace the mixers of Applicants' admitted prior art with more complex single sideband mixers when filters 141 and 142 already provide the requisite level of unwanted signal rejection. As such, the Examiner has failed to provide proper motivation for the combination of Applicants' admitted prior art and *Shalom*. Therefore, claims 1, 3, 4, and 8-33 which recite aspects relied upon in *Shalom* are patentable over the 35 U.S.C. §103(a) rejection.

2. No Suggestion or Motivation to Combine Applicants' Admitted Prior Art, *Shalom*, and *Tomasz*

The Examiner concedes that the modified system of the Applicants' admitted prior art (Applicants' admitted prior art in view of *Shalom*) does not teach mixers disposed on a common integrated circuit substrate. (Office Action, page 3). Therefore, the Examiner relies upon the third reference, *Tomasz*, to teach that mixers disposed on a common integrated circuit substrate are well known in the art. However, proper motivation is required to combine the reference teachings under 35 U.S.C. §103.

Neither the Applicants' admitted prior art, *Shalom*, nor *Tomasz* detail any desirability to combine all of the reference teachings. The Examiner merely asserts that mixers disposed on a common integrated circuit substrate are well known in the art, as disclosed by *Tomasz*, and thus, it would have been obvious to have mixers disposed on a common integrated circuit substrate to save space and cost. As such, the Examiner is using the Applicants' disclosure for motivation to combine. (Specification, page 4, lns 2-4).

Additionally, a prior art reference must be considered in its entirety, i.e. as a whole, including portions that would lead away from the claimed invention. MPEP §2141.02. In the present case, the Applicants' admitted prior art expressly sets forth that conventional wisdom is to implement discrete components for the tuner configurations described. (Specification, page 2, lns 24-28). Accordingly, it is respectfully asserted that the Applicants' admitted prior art relied upon in rejecting the present claims teaches away from integrated circuits as taught by *Tomasz* and the claimed invention. The fact that Applicants' admitted prior art teaches away from *Tomasz* and the claimed invention provides evidence of a lack of motivation to combine the applied references in order to meet the claims. Therefore, claims 4, 8-10, 16, 20-25, and 30-33 which recite the aspects relied upon in the third reference are patentable over the 35 U.S.C. §103(a) rejection of record.

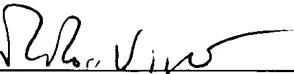
IV. Summary

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Applicants believe no fee is due with this response. However, if a fee is due, please charge Deposit Account No. 06-2380, under Order No. 49581/P024US/10006096 from which the undersigned is authorized to draw.

Dated: May 5, 2004

Respectfully submitted,

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